



Coyle, D., & Doherty, G. (2010). Stepped care and mental health technologies. In *ECCE 2010 workshop on Cognitive Engineering for Technology in Mental Health Care and Rehabilitation* (pp. 99-102).

Early version, also known as pre-print

[Link to publication record in Explore Bristol Research](#)
PDF-document

University of Bristol - Explore Bristol Research

General rights

This document is made available in accordance with publisher policies. Please cite only the published version using the reference above. Full terms of use are available:
<http://www.bristol.ac.uk/red/research-policy/pure/user-guides/ebr-terms/>

Stepped care and mental health technologies

David Coyle

University of Cambridge & Trinity College Dublin
William Gates Building, 15 JJ Thompson Ave
Cambridge, UK
coyledt@tcd.ie

Gavin Doherty

Trinity College Dublin
College Green
Dublin 2, Ireland
gavin.doherty@tcd.ie

ABSTRACT

Stepped care is increasingly seen as an appropriate model for efficient and cost-effective provision of needs-based mental healthcare services, and is now recommended by bodies such as the National Institute for Clinical Excellence. In this paper we examine how the stepped care model can provide a useful framework for thinking about new mental health technologies. Consideration of each level and intensity of care can suggest provision of specific technological support. Furthermore technology can potentially support transitions between levels of care and improve continuity of care. While it does not provide a complete framework for design – and can be criticised as being service-centred rather than client-centred – it can nonetheless provide a useful part of the analytic frame of the designer.

Categories and Subject Descriptors

H.5.m [Information Interfaces and Presentation]: Miscellaneous – interdisciplinary design, mental health

General Terms

Human Factors.

Keywords

Mental health, human computer interaction, stepped care.

1 INTRODUCTION

While the efficacy of many mental healthcare interventions has been well demonstrated [1, 2], traditional models for the delivery of services often provide poor levels of access to care. In many cases limitations in the availability of trained mental healthcare professionals, coupled with the time intensive nature of treatments, means that only a minority of people experiencing difficulties receive the treatment and support they need [3]. Given the constraints on the capacity of services, issues of cost and efficient use of available resources have become important areas of research in mental health service provision. Stepped care strategies have become an important focus for this research [4]. Numerous recent publications have also suggested that technologies can play an important role in improving access to professional services [5, 6]. In this paper we consider how uses of technology can be coupled with a stepped-care strategy to support improvements in the delivery of mental healthcare services. We approach this issue by asking two distinct but complementary questions:

1. How can technologies be designed to support stepped care interventions?
2. How can a stepped care model help us to think about the design of new technologies?

2 STEPPED CARE

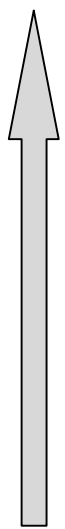
Stepped care is an approach to healthcare delivery in which different intensities of treatment are identified and in which people are allocated to a specific intensity of treatment based on an assessment of need. Bower and Gilbody [4] state:

“Stepped care is a model of healthcare delivery with two fundamental features. First, the recommended treatment within a stepped care model should be the least restrictive of those currently available, but still likely to provide significant health gain. Second, the stepped care model is self-correcting.”

In the UK The National Institute for Clinical Excellence has recently issued guidelines for the use of stepped care in the treatment of common disorders such as depression and anxiety [7, 8]. Table 1 below highlights a stepped-care model for depression. This table can help in identifying important aspects of mental health service provision.

Recognition of difficulty: the point of first contact between clients and a health care provider, typically a general practitioner, is explicitly recognised in the stepped care model. For many people taking the first step in seeking professional help is a significant barrier to treatment. Due to the severe limitations in available services, many people who do seek help and receive an initial assessment will not receive timely access to appropriate follow up treatment.

Table 1 – a stepped-care model for depression.

Step	Severity	Care giver	Treatment	Intensity
5	Risk to life Severe self-neglect	Inpatient care Crisis teams	Medication Combined treatments ECT	
4	Treatment-resistant Recurrent Atypical Psychotic	Mental health specialists Crisis teams	Medication Complex psychological interventions Combined treatments	
3	Moderate or severe depression	Primary care team Mental health specialist	Medication Psychological intervention	
2	Mild depression	Primary care team	Watchful waiting Guided self-help Computerised CBT Brief interventions	
1	Recognition of difficulty	GP	Assessment	

Severity of difficulties and levels of care: Public healthcare services are required to treat people experiencing varying severities of difficulty. After the point of initial assessment Table 1 highlights four broad levels of severity and follow up care. Clients may move between levels of care during the course of their treatment. Decisions regarding the appropriate level of care are a significant element of stepped care models. Assessment is standardised to a degree in a variety of formal questionnaires and manuals used by clinicians.

Care givers and contexts of care: within a stepped care model clients are likely to come into contact with many different care givers. The model tries to reserve contact time with more specialised - and therefore more costly and less easily available - professionals, for those clients experiencing more severe difficulties. Similarly some levels of care will be delivered in specialist inpatient (hospital) environments, whereas others will be delivered through specialist outpatient services, primary healthcare centres or via General Practitioners.

Treatment approaches: clients experiencing differing severities of difficulties can also be treated using a variety of treatment modalities, including mixed methods approaches – e.g. a combination of psychological and drug based medical approaches. Table 1 also notes the important role of self-help in managing milder difficulties.

Intensity of treatment: the primary aim of a stepped-care model is to allow services to maximise the effectiveness of available resources. As such variation in the intensity of treatment is a core element of the model. The core variable in treatment intensity is contact time between healthcare professionals and clients. Approaches used during different intensities of care may make very different demands on the attention and time of both clients and healthcare professionals. At low levels contact is likely to be minimal. At higher levels contact increases, e.g. monthly at step 3 and weekly at step 4. Based on an ongoing assessment of needs clients are assigned to the level of care that minimises the demand for contact, while still offering the potential for significant health gain. Computer supported treatments offer the ability to introduce additional variables at all levels of a stepped care model - i.e. some degree of computer support as an alternative to therapist contact time.

3 STEPPED-CARE AND MENTAL HEALTH TECHNOLOGIES

As noted in Table 1, computerised Cognitive Behaviour Therapy (cCBT) has been recommended by organisations such as NICE as an appropriate approach to the treatment of mild depression (in adults). However we believe that appropriately designed technologies can play a significant role in the delivery of care across the entire stepped care range.

Different technologies can be used within mental healthcare for many different purposes. Maximising the potential of individual technologies, understanding the contexts in which each will have the most impact and exploring the most effective means of integrating technologies, represent significant challenges for future research in this area.

In this section we suggest that designers can gain some conceptual leverage by viewing possible technologies in terms of a stepped care model. The different levels of care, mechanisms of care, context of care, and personnel involved in treatment both suggest possible supports and constrain the appropriateness of solutions.

3.1 Designing for different intensities of care

Stepped care has been highlighted as a potential solution to access constraints in mental healthcare. However recent HCI research has highlighted a second significant challenge for services: client engagement. Even when professional help is available many clients struggle to engage effectively with treatment. In traditional, contact intensive treatment approaches, the strength of the relationship between therapists and clients is a major factor in achieving client engagement. Variations in the intensity of treatments can therefore have a profound impact on cross-cutting concerns such as designing for engagement.

At lower levels in the model the face-to-face contact with mental health professionals is minimal and computer mediated communication may be used as the primary means of communication between caregivers and those receiving treatment. Design factors regarding relationship building via computer mediated contact and the strengths and weakness of different forms of electronic contact therefore become critical considerations. Also, where face-to-face contact cannot be relied on as a motivating factor for clients, it may become necessary to consider other ways in which technology can be used to maintain engagement. The failure to consider such issues may explain the high attrition rates found in studies of many current cCBT systems. In traditional treatments the use of group therapy approaches and benefits of drawing on clients social supports – e.g. friends and family – have long been recognised. This raises the interesting question of how social support could be taken into account in the design of technologies, e.g. through the use of online social networks.

At higher levels of a stepped care model computer mediated contact may still be used as an adjunct communication channel to supplement more regular face-to-face contact. However at these levels engagement factors in face-to-face settings must also be considered. For example damage to the client-therapist relationships has been highlighted as a potential negative factor in introducing technology to clinical settings [9]. Designers must be sensitive to this concern. In our own previous research we have focused on developing systems that support face-to-face communication between therapists and adolescents. In one case a therapeutic computer game was found to assist in building and maintaining relationships and help in structuring clinical sessions [10]. In another case a mobile phone diary was developed which allows clients to gather daily mood information [11]. This mobile application linked to an online mood charting webpage, which clients and therapists could view together. In this way material gathered between sessions could be used to support face-to-face activities.

In this section we have chosen to focus on engagement issues at different levels of treatment intensity. However we believe this approach could also be used highlight other constraints. For example at lower levels of intensity the use of highly specialised or expensive technologies is unlikely to be feasible. Rather it may be necessary to focus on readily available technologies, which the clients already use in their day-to-day lives, e.g. their mobile phone.

3.2 Transitions between levels of care

As clients receive treatment, it is likely that the appropriate intensity of treatment will change over time. Some people experiencing a crisis may need intensive acute care, but following improvement may be expected to move to a lower intensity form

of treatment. Some technologies will benefit clients across multiple different levels of care, and hence the ability to use and adapt the same technology across these different levels of care, supporting these transitions, would be extremely useful.

We could ultimately have the notion of end-to-end support for individuals, providing an extremely valuable opportunity to provide better continuity of care. For example, people receiving mental health treatment (like many healthcare users) dislike having to repeat themselves to different clinicians. While this will arise partly due to personnel changes, it can also arise given the increasing use of multi-disciplinary teams, which may involve psychiatrists, clinical psychologists and social workers. Technology can potentially support the collective memory of the client's history in a more accessible and useful format than traditional medical records.

This might also be important for the client themselves, as understanding and reflecting on their own experience is an important component of many approaches to treatment. While systems such as those for self-recording mood may support this implicitly, we can also imagine systems which are designed in order to explicitly represent trajectories of care.

3.3 Supporting stepped-care decisions

As previously noted in section 2, stepped care models should be self correcting. Clients' reactions to treatment strategies should be assessed on a regular basis, with corrections made to the level of care as appropriate. Technologies offer the potential to gather information more intensively and use this information as the basis for ongoing stepped-care decisions. However while the use of computerised decision support has been the focus of a considerable body of work in medicine, relatively little has been done in mental healthcare areas.

One initial area of research has been the computerised administration of standardised mental health questionnaires used to produce an initial diagnosis [add ref]. The severity of the disorder as measured by these instruments provides a basis for a decision on the initial level of care to be given. Another immediate opportunity for supporting decisions regarding the appropriate level of care is in gathering and presenting information to the clinician. The mobile phone based mood diary system, and associated online charting functionality provides a good example of this. In the clinical case studies, the high adherence and long duration of use allowed significant volumes of self-recorded mood information to be gathered, facilitating decisions by mental health professionals on medication and intensity of treatment.

3.4 Reducing the initial barriers to treatment

The stepped care model outlined in Table 1 does not formally consider aspects of mental healthcare prior to the point of first contact. Recognition of difficulty and the point of first contact are however highlighted as the start point of the stepped care ladder. Before they can receive help it is necessary for clients – or sometimes a family member or friend – to realise that they have a mental health problem, that they need help, and that help is available to them.

Some individuals may be reluctant to recognise their condition as being problematic. In many cases the high degree of stigma associated with mental health difficulties represents a significant barrier to care. Public health information campaigns conveying psycho-educational material often seek to address these issues, and there are opportunities for technology to be used to make such

campaigns more engaging, particularly for younger people. Here technology may be seen as a means of providing easily accessible, population wide psycho-education. The use of technology can also go beyond other media such as television and print advertising, by providing direct, actionable links to available support. The anonymity and round-the-clock availability of electronic contact also serves to reduce the barriers of stigma and access to services.

Having made contact with a service, the person seeking help must then be able to articulate their difficulties; many people will find this difficult, and again there may be opportunities for technology to help here – the online disclosure effect may be of significant advantage for example, even if the main mode of treatment will ultimately be face to face.

3.5 Post-treatment support

For many individuals the trajectory of care and formal treatment will have a distinct end, and care will only be given again if sought in response to a recurrence of the disorder. For others there may be a significant post-treatment period in which low intensity support is given. However, it is also worth considering that in some cases (e.g. bipolar disorder), after transition to a lower level of care following a successful intervention, the management and maintenance of the condition may continue over a very long period or indefinitely. In such cases it may be appropriate to view the trajectory as ending in management of a chronic condition, with similarities to management of other long term conditions such as diabetes. Each of these cases poses a particular set of challenges to the designer, and the appropriate form of solution may differ for each.

4 DISCUSSION

Evidence is slowly mounting that a range of technologies have the potential to reduce contact time at all levels of care within a stepped care model, as well as supporting people in seeking treatment in the first place. Even where there is a substantial face-to-face component to treatment, there is an opportunity to provide increased support between sessions, and ultimately support better outcomes for clients. These improved outcomes may be achieved through reductions in attrition rates and increased engagement with the treatment by the client. A stepped care model can also lead us to consider not just the contextual factors surrounding technologies deployed at a given level, but also how clinicians and service users can be supported as they move between different modes of treatment and changes to intensity of treatment.

As evaluation is critical for the development of high quality systems and credible evidence is vital for the acceptance of mental healthcare technologies, it is interesting to consider the implications of the model for the evaluation of new technologies. The traditional view and format for controlled experimental trials is very much one in which a particular level of the model is investigated. We foresee problems in evaluating technologies to be used across multiple levels of care and which are designed to support transitions between levels of care. It may be that many useful technologies may not fit neatly enough within the service provision model to allow a standard path towards stronger evidence base in medical environments to be followed.

4.1 Limitations

The argument of this paper is that the stepped care model provides a useful framework for thinking about mental health technologies and the relationship between different technologies that may be

used across the trajectory of care of people experiencing difficulties. However, the stepped care model is by no means complete from a design perspective; it does not address the overall trajectory of patient experience, from realising need and seeking help through to maintenance of healthy thinking and behaviours. The model has also been designed from the perspective of healthcare providers, and as such it is not necessarily a client-centred model. For example, the model is needs based from the service provider perspective. A more complete framework for thinking about client needs would perhaps form a useful complement to the stepped care model.

5 ACKNOWLEDGMENTS

David Coyle is supported by a Marie Curie post-doctoral research fellowship, awarded jointly by the Irish Research Council for Science, Engineering and Technology and the EU FP7 COFUND scheme. This research has also benefited from the support of Enterprise Ireland and the National Digital Research Centre.

6 REFERENCES

1. Department of Health, (2001) Treatment Choice in Psychological Therapies: Evidence Based Clinical Practice Guidelines. Department of Health London
2. Surgeon General, (1999) Mental Health: A Report of the Surgeon General - Executive Summary. Department of Health and Human Services: Washington, DC.
3. World Health Organisation, (2004) The Global Burden of Disease: 2004 update. WHO Press: Geneva, Switzerland.
4. Bower, P. & Gilbody, S., (2005) Stepped care in psychological therapies: access, effectiveness and efficiency. *British Journal of Psychiatry*, 186: p. 11-17.
5. Coyle, D., Doherty, G., Matthews, M., & Sharry, J., (2007) Computers in Talk-Based Mental Health Interventions. *Interacting with Computers*, 19(4): p. 545-562.
6. Marks, I.M., Cavanagh, K., & Gega, L., (2007) Hands-on Help: Computer-aided Psychotherapy. 1st ed. Maudsley Monographs Psychology Press Ltd. 296.
7. NICE, (2007) CG22 Anxiety: quick reference guide (amended). National Institute of Clinical Excellence.
8. NICE, (2009) CG90 Depression in adults: quick reference guide. National Institute of Clinical Excellence.
9. Caspar, F., (2004) Technological Developments and Applications in Clinical Psychology: Introduction. *Journal of Clinical Psychology*, 60(3): p. 221-238.
10. Coyle, D. & Doherty, G. (2009) Clinical evaluations and collaborative design: developing new technologies for mental healthcare interventions. in CHI'09 ACM Conference on Human Factors in Computing Systems. Boston, USA.
11. Matthews, M., Doherty, G., Coyle, D., & Sharry, J. (2007) Designing mobile applications to support mental health interventions, in Handbook of Research on User Interface Design and Evaluation for Mobile Technology, J. Lumsden, Editor.